

IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) A system to process packets received over a network, the system comprising:

a receiver ~~process of at least one thread of a network processor, the receive process~~ configured to receive a plurality of data of packets, different ones of the each data packets belonging to at least one different flows; and

a transmitter ~~process of at least one thread of the network processor configured to~~ transmit the plurality of data packets received by the receiver ~~process~~;

a scheduler ~~process of at least one thread of the network processor configured to~~ populate at least one schedule of flow service based, at least in part, on quality of service characteristics associated with the ~~different~~ at least one flows, the at least one schedule of flow service configured to identifying a plurality of different flow candidates for service, the at least one schedule of flow service including a schedule wheel having a collection of slots, an individual slot including an array of entries corresponding to different egress ports, the scheduler further configured to schedule service of the at least one flow based, at least in part, on a port bandwidth vector associated with an egress port used to transmit packets, individual elements within the port bandwidth vector identifying whether the egress port has been reserved for transmission, individual elements within the port bandwidth vector corresponding to different slots within the schedule wheel; and

a shaper ~~process of at least one thread of the network processor configured to access the~~ schedule wheel to select from the ~~candidate~~ plurality of different flows candidates for service ~~from the at least one schedule~~.

2. (Currently Amended) The system of claim 1, wherein

the plurality of data packets comprise Asynchronous Transfer Mode (ATM) cells;
the at least one flows comprises at least one of virtual circuits and virtual paths; and
the quality of service characteristics comprise at least one of the following classes:

Constant Bit Rate (CBR) and Variable Bit Rate (VBR).

3. (Currently Amended) The system of claim 1, wherein the system further comprises a queue manager ~~process of at least one thread of the network processor~~ configured to queue packets based on their associated at least one flow.

4. (Original) The system of claim 3, wherein the queue manager is situated in a process-flow before the scheduler.

5. (Currently Amended) The system of claim 1, wherein ~~the~~ at least one of the process threads communicates a message to a subsequent thread ~~in a subsequent one of the processes~~ via at least one neighbor register provided by a packet engine processing the at least one ~~of the process~~ threads.

6. (Currently Amended) The system of claim 1, wherein at least one thread of the scheduler ~~process~~ comprises more than one thread, different ones of the threads operating on different packet engines of the network processor.

7. (Cancelled)

8. (Currently Amended) The system of claim ~~7~~ 1, wherein individual entries within the array of entries comprise the plurality of different flow ~~service~~ candidates assigned to different service priorities.

9. (Currently Amended) The system of claim ~~7~~ 1, wherein the ~~at least one scheduler thread~~ comprises at least one thread to cache at least one of the following in memory of a packet engine in the ~~network~~ processor: traffic parameters of a flow and a portion of a schedule wheel occupancy vector identifying scheduling candidate vacancies in the ~~scheduling~~ ing wheel.

10. (Cancelled)

11. (Original) The system of claim 1, wherein the schedule comprises multiple schedule wheels, different wheels corresponding to different ports.

12. (Currently Amended) The system of claim 1, wherein
the ~~at least one thread of the scheduler process~~ comprises at least one scheduler thread to identify flows associated with best-effort service; and

the ~~at least one thread of the shaper process~~ comprises at least one shaper thread to service a best-effort flow using egress port bandwidth unscheduled by the at least one schedule.

13. (Currently Amended) The system of claim 12, wherein the at least one scheduler thread to identify flows associated with best-effort service comprises at least one thread to send a message to at least one shaper thread identifying a subset of a best-effort vector, individual entries in the best-effort vector corresponding to a flow.

14. (Original) The system of claim 12,
wherein the at least one shaper thread identifies a schedule wheel slot processed by the shaper; and

wherein the at least one scheduler thread schedules a flow for service based on the identified schedule wheel slot.

15. (Original) The system of claim 12, wherein the at least one shaper thread processes each slot for the same amount of time.

16. (Currently Amended) The system of claim 1, wherein the ~~at least one shaper thread is~~ configured to:

queues flows associated with ports having flow control asserted; and
dequeues the flows after flow control is deasserted.

17. (Currently Amended) The system of claim 16, wherein

the shaper thread is configured to queues the flows with identification of classes of service associated with the flows and selects flows for servicing after flow control is deasserted based on the identification.

18. (Currently Amended) The system of claim 1, wherein the ~~at least one of thread of the schedule process~~ comprises a thread to schedule a flow for service in multiple slots.

19. (Currently Amended) ~~A computer program product, disposed on a computer readable medium, the product including instructions for causing packet engines of a network processor to provide~~ An article comprising a storage medium having stored thereon instructions that when executed by a computer result in the following:

~~a receive process of~~ receiving at least one thread of a ~~network~~ processor ~~at a receiver, the receiver process configured to receive~~ a plurality of data of packets, ~~different ones of the each data packets belonging to at least one different flows; and~~

~~a transmit process of~~ transmitting the plurality of data packets ~~at least one thread of the network processor via a transmitter configured to~~ transmit packets received by the receiver process;

~~a scheduling process of at least one thread of the network processor to populate~~ at least one schedule of flow service based, at least in part, on quality of service characteristics associated with the ~~different at least one~~ flows, the at least one schedule of flow service configured to identifying a plurality of different flow candidates for service, the at least one schedule of flow service including a schedule wheel having a collection of slots, an individual slot including an array of entries corresponding to different egress ports, the scheduler further configured to schedule service of the at least one flow based, at least in part, on a port bandwidth vector associated with an egress port used to transmit packets, individual elements within the port bandwidth vector identifying whether the egress port has been reserved for transmission, individual elements within the port bandwidth vector corresponding to different slots within the schedule wheel; and

~~a shaper process of accessing the schedule wheel via a shaper at least one thread of the network processor to select from the candidate plurality of different flows candidates for service based on the at least one schedule.~~

20. (Currently Amended) The ~~product article~~ of claim 19, wherein the plurality of data packets comprise Asynchronous Transfer Mode (ATM) cells; the at least one flows comprises at least one of virtual circuits and virtual paths; and the quality of service characteristics comprise at least one of the following categories: Constant Bit Rate (CBR) and Variable Bit Rate (VBR).

21. (Currently Amended) The ~~product article~~ of claim 19, ~~wherein the instructions further comprise managing via a queue manager process of at least one thread of the network processor configured to queue packets based on their associated flow.~~

22. (Currently Amended) The ~~product article~~ of claim 19, wherein the at least one of the ~~process~~ threads communicates a message to a thread in a subsequent one of the processes via at least one neighbor register provided by a packet engine processing the at least one of the ~~process~~ threads.

23. (Currently Amended) The ~~product article~~ of claim 19, wherein at least one thread of the scheduler ~~process~~ comprises more than one thread, different ones of the threads operating on different packet engines of the network processor.

24. (Cancelled)

25. (Currently Amended) The ~~product article~~ of claim 24~~19~~, wherein individual entries within the array of entries comprise flow service candidates assigned to different service priorities.

26. (Cancelled)

27. (Currently Amended) The ~~product~~ article of claim 19, wherein the ~~at least one thread of the scheduler process~~ comprises at least one scheduler thread to identify flows associated with best-effort service; and

the ~~at least one thread of the shaper process~~ comprises at least one shaper thread to service a best-effort flow using egress port bandwidth unscheduled by the at least one schedule.

28. (Currently Amended) The ~~product~~ article of claim 27, wherein the at least one scheduler thread to identify flows associated with best-effort service comprises at least one thread to send a message to the at least one shaper thread identifying a subset of a best-effort vector, individual entries in the best-effort vector corresponding to a flow associated with best-effort service.

29. (Currently Amended) The ~~product~~ article of claim 19, wherein the at least one scheduler thread comprises at least one thread to cache traffic parameters of a flow in packet engine memory.

30. (Currently Amended) A system to process Asynchronous Transfer Mode (ATM) cells received over a network, the system comprising:

multiple line cards, an individual line card including:

at least one physical layer component (PHY); and

at least one network processor having multiple packet engines having access to instructions to provide:

a receiver ~~process of at least one thread of a network processor, the receiver process configured to receive a plurality of data of cells, different ones of the each data cells belonging to different~~ at least one virtual circuits; and

a transmitter ~~process of at least one thread of the network processor configured to transmit the plurality of data cells received by the receiver process;~~

a scheduler ~~process of at least one thread of the network processor configured to generate at least one schedule for virtual circuit service, based at~~

least in part, on quality of service classes associated with the virtual circuits, the at least one schedule comprising a schedule wheel having a collection of slots, an individual slot including an array of entries corresponding to different ports, individual entries within the array of entries including virtual circuit service candidates assigned to different service priorities, the scheduler further configured to schedule service based on, at least in part, a port bandwidth vector associated with an egress port used to transmit cells, individual elements within the port bandwidth vector identifying whether the egress port has been reserved for transmission, individual elements within the port bandwidth vector corresponding to different slots within the schedule wheel; and

a shaper ~~process of at least one thread of the network processor~~ configured to identify virtual circuits to service based on the schedule wheel slots; and a switch fabric interconnecting the multiple line cards.

31. (Original) The system of claim 30, wherein at least one of the process threads communicates a message to a thread in a subsequent one of the processes via at least one neighbor register provided by a packet engine processing the at least one of the process threads.

32. (Cancelled)

33. (Currently Amended) The system of claim 30, wherein the ~~at least one thread of the scheduler process~~ comprises at least one scheduler thread to identify flows associated with best-effort service; and the ~~at least one thread of the shaper process~~ comprises at least one shaper thread to service a best-effort flow using egress port bandwidth unscheduled by the at least one schedule.

34. (Currently Amended) The system of claim 33, wherein the at least one scheduler thread to identify flows associated with best-effort service comprises at least one thread to send a message to a shaper thread identifying a subset of a best-effort vector, individual entries in the best-effort vector corresponding to a flow associated with best-effort service.